MEKELLE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGEMENT

EXPLORATION OF CHALLENGES AND PROSPECTS OF Milk PRODUCTION

(A SURVEY STUDY ON MEKELLE CITY)

BY:

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Thesis Submitted in Partial Fulfillment of the Requirements for the Award of Master of Business Administration Degree With Specialization in Marketing Management

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DECLARATION

I, Solomon Mebrahtu, hereby declare that the research thesis work entitled “Exploration of Challenges and Prospects of Dairy Production: A survey study of Mekelle city:” submitted by me for the award of the Degree of Master of Business Administration. It is my original work and it has not been presented for the award to any other Degree, Diploma, Certificate or other similar titles of any other University or institution. Finally, I also confirm that all source materials used in the material are recognized and dully acknowledged.

Solomon Mebrahtu Signature: _____

June, 2014

Mekelle University, Mekelle

CERTIFICATION

This is to certify that the thesis entitled "**Exploration of Challenges and Prospects of Dairy Production: A survey study of Mekelle City, Ethiopia**", submitted in partial fulfillment of the requirements for the award of the degree Master of Business Administration with specialization in Marketing Management to the Department of Management, College of Business and Economics, Mekelle University. The thesis is carried out by Ato **Solomon Mebrahtu G/Silassie**, I.D. No. (R) 057/2005 under our supervision.

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We, the undersigned, members of the Board of Examiners of MA Thesis Open Defence Examination, have read and evaluated the Thesis prepared by Solomon Mebrahtu G/silassie and examined the candidate. This is therefore to certify that the thesis be accepted as fulfilling the Thesis requirement for the Degree of Master of Business Administration.

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Abstract

The study aims at exploring the challenges and prospects of dairy production in Mekelle city. The study was conducted in five local administration of Mekelle city; namely Ayder, Hadnet, Hawlti, Qwhia and Semien. Milk was the most important dairy product marketed in the areas, so, the study was focused only on milk. Dairy Farmers from each local administration were selected using Proportional Probability to Size (PPS).The research were designed with cross sectional survey design for the small holder dairy farmers and census design for the dairy cooperatives. Data were collected from 160 small holder dairy farmers and 20 dairy cooperatives using semi structured questionnaire. Survey data collected from five local administrations was analyzed by using descriptive analysis. The major challenges of dairy production in the area were shortage of feed, high costs of feeds, seasonality of milk demand occurred due to fasting season, access to credit, inadequate land for dairy expansion and preparation of feeds, Artificial insemination problem, shortage of water. The study area were dominated by both urban and pre-urban milk production. The dairy market in the study area uses informal marketing system. The milk producers were not process and handle the milk through utensils. There were also opportunities for milk producers in the study area; rapid urbanization, extensive population growth and change in the living standard of the societies, animal health service, Artificial insemination, extension and training services were among the opportunities. Therefore, dairy processing industries establishment, support for dairy producers and cooperatives, and improving access to services like credit, land, water, feed, etc. should receive due attention in order to improve dairy production in the study area.

Acronyms and Abbreviations

AI	Artificial insemination
BOUAD	Bureau Of the Urban Agricultural Development
CSA	Central Statistical Agency
DDE	Dairy Development Enterprise
ESAP	Ethiopian Society of Animal Production
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
ILCA	International Livestock Research Center for Africa
ILRI	International Livestock Research Institute
IPMS	Improving Productivity And Market Success Of Ethiopian Farmers Project
IPS	International Project Service
NGOs	Non-Governmental Organizations
PLW	Pilot Learning Woredas
PPS	Proportional Probability to Size
REST	Relief of society of Tigray
RMA	Rapid Market Appraisal
SPSS	Statistical Package for Social Science

UNDP	United Nation Development Program
USA	United State of America

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CHAPTER- ONE

INTRODUCTION

1.1. Background of the Study

Dairy production is a biologically efficient system that converts large quantities of roughage, the most abundant feed in the tropics, to milk, the most nutritious food known to man. It is also more labor intensive and supports substantial employment in production, processing and marketing (De Leeuw, A.Omore, S. Staal, and W. Thorpe 1999). A dairy product is food produced from the milk of mammals. Dairy products are usually high energy-yielding food products. A production plant for the processing of milk is called a dairy or a dairy factory. Apart from breastfed infants, the human consumption of dairy products is sourced primarily from the milk of cows, yet goats, sheep, yaks, horses, camels, and other mammals are other sources of dairy products consumed by humans (De Leeuw, 1999).

An estimated 75 percent of the world's poor live in rural areas, and at least 600 million of these people possess livestock to produce food, generate income, manage risks and increase assets (FAO, 2010). The development of small-scale livestock enterprises must be seen as a key element of any efforts to eliminate extreme poverty and hunger, and it is the important contribution livestock makes to sustaining livelihoods, especially in rural areas, (FAO, 2010).

The majority of African countries economy are dependent on agriculture, it helps to create job opportunities, income generation and involve in exports. As money received by the families increases, they are more excited to save and expense money, stimulating to growth and investment in other sectors. Agricultural sector is an essential to rise continuously to deal with famine, poverty and unfairness. Because, having a strong agriculture sector helps to creates more job opportunities, earn more money and more food for the poor (FAO, 2003).

The sub-Saharan Africa livestock sector performance in the last twenty years has not been sufficient; in most African countries, development in livestock production has been inadequate even to keep levels of consumption (Addis, 1989). According to Massow, (1989),

it is hard to increase production and marketing systems which can efficiently provide the rising urban demand where traditional pastoral systems make milk mostly for survival in the infertile zone and parts of the partially fertile zone. Furthermore, African governments have often got involved on behalf of urban interests to the damage of producer price incentives. Like other African countries, agriculture is the main determinant for Ethiopian economy, and livestock is a crucial component of the rural economy and the livelihood of the survival farmers. The livestock subsector plays an essential role as basis of food, income, services and foreign exchange to the Ethiopian economy, and gives to 12% and 33% of the total and agricultural GDP, respectively, and accounts for 12–15% of the total export earnings (Ayele, Assegid, Jabbar, Ahmed and Belachew, 2003). Due to having a large livestock population, a favorable climate to get a better production, and comparatively the environment is free from disease for livestock; Ethiopia holds huge possibility for dairy development. Ethiopia obtain milk production largely from cow however, it also get a little bit quantities from goat and camel in some regions specifically in pastoralist areas like Afar and Somali region (Ketema, 1995). Although the livestock population is large, the available livestock subsector in Ethiopia is small in production in general, and compared to its potential, the direct contribution it makes to the national economy is insufficient. Ethiopia is currently unable to meet the increasing demand for milk and other dairy products for its increasing population, especially in the urban areas (Getachew and Gashaw, 2001).

Like most developing countries, Ethiopia's increasing human population, urbanization trends and rising household incomes are leading to a substantial increase in the demand for livestock products, particularly milk and meat. In order to meet the growing demand for milk in Ethiopia, milk production has to grow at least at a rate of 4 percent per annum (Assaminew and Eyassu, 2009). Milk production is an essential livestock-sector activity. Previously, the demand for milk were decided by the number of people, while at this time it is gradually determined by the increasing per capita income for milk consumption in the developing countries (Ketema, 1995).

1.2. Statement of the Problem

By the year 2030, the present proportion of urban population will enlarge from 75% to 83% in Latin America and Caribbean, from 37% to 53% in Asia and Pacific and from 38% to 55% in Africa (FAO, 2003). As the population density expected to increase, the consumption for milk increased during the last twenty years are estimated to keep on in the coming years, and creating an actual livestock change due to there is a rapid population growth, more people leave countryside to live in urban and expected income growth. This change gives new and increasing market opportunities for small holder livestock producers (Delgado, 1999).

The fast movement of people from countryside to live in cities, following increase in human inhabitants and standard of living of the urban population especially the regional town Awassa as well as the rest three zonal towns can be thought as a good opportunity for the expansion of dairy in the area (Sintayehu, et al., 2008).

Countries that are presently taking pleasure in the maximum standard of living are those that have a well developed animal agriculture as demand for animal products enhance with economic growth. In Ethiopian context, in spite of the large capacity for development the country has to make milk, there is a constant shortage of the product in most part of the country. This is reflected where only 5% of milk produced in rural areas is marketed as liquid milk (Getachew, 2003). This occurs largely from inadequate production joined with inhibitive cultural undesirable related to consumption and lack of correct processing and marketing (Zegeye, 2003).

Mekelle is one of the urban areas looking for milk and milk products as food. Despite the dairy growth capacity play a positive role to the economy, Mekelle dairy sector is not well developed. The existing level of milk production produced by the smallholder farmers are not being satisfied to the rising demand for processed dairy products. To narrow the gap between the domestic demand and supply of dairy products, it is important to increase domestic production level. In Mekelle, there are around 790 small enterprises which are participated in milk production (BOUAD, 2013).

There are many factors which constrain livestock sectors from producing dairy production in huge. Researches related to this title has been made by many investigators. The major factors which constrain milk production and marketing in Ethiopia were insufficient supply of quality feed and its high cost (Ahmed, Ehui and Yemesrach, 2003; Assaminew and Eyassu, 2009; Sintayehu, et al., 2008; Adebabay, 2009; Shamsuddoha and Edwards, 2000). More specifically, access to credit, seasonality of demand particularly in fasting time were the major challenge of milk production and marketing in the area. The milk market in the study area uses informal marketing system, which shows the under development of milk marketing.

To the best of my knowledge, the constraints of milk production, and the ways of milk handling and processing has not been studied extensively in the region and Mekelle town.

There is a seasonal fluctuation between demand and supply for milk in the study area, it represents there is unexploited capacity for growth of dairy production systems in the study area due to having large potential. In addition, milk is highly perishable product, especially during the fasting season the demand for milk decline and the milk become spoil. Milk have an effect on a potential public health if it is perished and spoilage due to declining in consumption because milk provides nutrients that are not available in great quantities in other foods. Market-oriented urban and pre-urban dairy production systems play an important role in reducing the extreme scarcity of milk and dairy products and have great potential for expansion in city centers (Azage, Tsehay, Alemu and Hizkias, 2000).

This study explored the challenges and prospects of dairy production: dairy marketing system, ways of dairy processing and milk handling, and challenges and opportunities of dairy production. The study is crucial to provide essential information on the operation of dairy production and contribute in filling the demand and supply gap of dairy products by exploring the challenges and prospects of dairy product in Mekelle city.

1.3. Research Questions

1. What type of production system exist in the study area?

2. How is the dairy marketing system going on in Mekelle city?

3. What are the methods used for dairy processing and milk handling?

4. What are the major constraints and opportunities for milk production?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of the study is to explore the challenges and prospects of milk production in Mekelle city.

1.4.2. Specific Objective

- To examine the milk production system
- To describe the milk marketing systems.
- To explore ways of milk handling and processing.
- To identify constraints and opportunities of milk production.

1.5. Scope and Limitation of the Study

The study is conducted in Mekelle city, which is the seat for Tigray National Regional State. Mekelle has seven local administrations namely; Semien, Hawlti, Hadnet, Kedamay Weyane, Ayder, Adi-Haqi and Qwhia. The study would not focus on all the local administrations. Because, there were two local administrations which dairy farming were not undertaken. So, the study covers the five local administrations excluding Adi-Haqi and Kedemay Weyane. This study emphasis on small holder dairy farmers as well as dairy cooperatives of five local administrations in Mekelle. These areas are involved in milk production and have potential to supply dairy products to the consumers of the city. The study is focus on the area of to explore challenges and prospects of dairy products and to identify the factors that affect milk production in Mekelle city. Due to unmanageability to see all dairy products, the study is

focus only on raw/ liquid milk product. All the independent variables which affect the milk production were not investigated in this study. The independent variables which were addressed on this study are water, number of milking cows, access to credit, land size, feed, financial income, and demand for milk. The study is investigated the challenges and prospects faced to the producers for the last year 2013 G.C.

Regardless of the fact that the researcher has made all the best to maximize its fruitfulness, the study subjected to some limitations that originated from its scope. Due to the purpose of the study, researcher were collect a data from 160 small holder dairy farmers and 20 dairy cooperatives of the five local administrations so; these may have limitation on the results of the study to generalize/conclude/ about all small holder dairy farmers. The study limited to one type of dairy product that is milk, the reason was because of unmanageability to see all dairy products. In addition, academic resources on issues helpful to the body of this study were very few. So; the researcher was constrained accessing adequate empirical studies conducted in Ethiopia which directly related to dairy products. Moreover, as every sampling technique has some inherent drawback, the purposive sampling technique has used to select the respondents. The research has its own limitations such as variables which affect the milk production like market information, transportation, social, legal, cultural aspects were not studied. Therefore, the above issues were limitations of this research.

1.6. Significance of the Study

The study is attempted to explore challenges and prospects of milk production in Mekelle city. Besides, the study identified the factors that affect milk production significantly an important input for designing appropriate strategies in order to satisfy the demand of dairy products. This study provided information on challenges and prospects of milk production, milk marketing systems, and milk handling and processing.

Organizations which are engaged in the development of livestock sub-sector will be beneficiary from the results of this study. The findings of this study are also believed to be useful to dairy producers, traders and investors to make decisions. The study can also serve as an additional source for researchers to conduct studies on the same or related kinds in

other parts of the country. Therefore, it is hope that, results from this study will have practical use mainly to this area and similar to other areas and can also serve as a base for any further studies to be conducted in other areas in this line of study.

CHAPTER- TWO

LITERATURE REVIEW

2.1. Milk Production System in Ethiopia

In Ethiopia, dairying is practiced all over the country by a large number of small or medium or large-sized, subsistence or market-oriented farms. Cattle, camel and goats are the main livestock species that supply milk in Ethiopia, with cows contributing 81.2% of the total milk output (Getachew, 2003). In Ethiopia, urban and pre-urban areas are used about 300,000 exotic cows for milk production under improved management conditions (Azage, et al., 2000).

According to (Tsehay, 2002), Based on their location, milk production systems can be classified into three: urban, pre-urban and rural milk production systems. In general, urban dairy production system are placed in cities and towns, with small or no access to grazing land and small feeding conditions which focus on the production and sale of fluid milk, using the available human and capital resources. Urban dairy production system have a better access to inputs and services provided by the public and private sectors, and use intensive management compared to other systems (Azege, Berhanu, Dirk, Berhanu And Yoseph., 2013). Highly specialized, or businessmen owned farms, which are highly involved in urban dairy farming system of the country (Getachew and Gashaw, 2001; Azage, 2003).

Due to urbanization around big cities like Addis Ababa, the population density is high and agricultural land is decrease. Pre-urban milk production is developed in these type of areas. Smallholder and commercial dairy farmers sectors in the proximity of Addis Ababa and other regional towns are included and owns the pre-urban milk system (Tsehay, 2001). The primary objective of pre-urban milk production is to generate income from milk sale and main source of feed is both home produced or purchased hay. Pre-urban milk production have an access to grazing land, which produces part of the remaining feed in the form of crop (Azege, et al., 2013). At this time, in the urban and pre-urban areas of the capital, a number

of smallholder and commercial dairy farms are emerging (Getachew and Gashaw, 2001; Azage, 2003).

According to (Ahmed, et al., 2003) another types of dairy production system is the rural dairy system, which includes pastoralist, agro pastoralist and mixed crop–livestock producers, mainly in the highland areas. The milk produced in rural dairy system is consumed for personal purpose and not market-oriented. The demand for milk by the family and its neighbors, the potential to produce milk in terms of group, and access to a close market is determinant for the level of extra milk (Getachew, 2003). Using traditional technologies, the extra milk is processed in to by-product such as butter, ghee, ayib and sour milk which are usually marketed after the households satisfy their needs through the informal market (Tsehay, 2001). Rural highland dairy system of Fogera and Bure, which has limited access to urban centers where fluid milk is demanded are focus in these systems on processing of milk into butter and other dairy products for sale and home consumption (Azege, et al., 2013).

According to (Azege, et al., 2013) In general, both pre-urban production and rural dairy systems have an access to grazing land and practice mixed crop–livestock farming, which produces part of the remaining feed in the form of crop. However, unlike urban dairy production, rural dairy system does not have an access to inputs and services. Household themselves are handling the process of milk into butter and cottage cheese and sale of butter as well.

As cited in (Adane, 2009) Milk is one of the most important livestock products and main diet for pastoralists in the Borena pastoral communities. The population and distribution, and the availability of natural grazing land and water are influential for milk production from milking animals (Cattle, camels, sheep and goats). In addition, there are also other important factors which influencing milk production in the pastoral systems such factors as types of animal breeds, the composition of milking animals in herd and etc. The milk production also influenced by the environmental situation. The milk production will better if the environment is comfortable and vice versa.

Milk production system is highly concentrated by the most specialized and high-tech system, few industries and governmental sectors are highly practiced in milk production system on commercial basis in and around Addis Ababa (Belete, 2006).

2.2. Milk Marketing System in Ethiopia

Market refers to a place where buyers and sellers interact and influence price. Although the market exist, it does not ensure an exchange to take place unless there should be a channel. Milk production is seasonal in pastoral area whereas consumption is throughout the season (IPS, 2000). Additionally, there are insufficient availability of processing techniques, and physical infrastructure, and market facilities in pastoral area (Ketema and Tsehay, 1995). However, since dairy makes more efficient use of feed resources and provides regular income to the producer, dairying is preferred to meet production where there is enough availability of infrastructure and access to market (De Leeuw, et al., 1999).

Milk marketing is serve as an incentive for farmers to produce more. It stimulates farmers to produce more, increase farmers income generation and living standards and create an employment opportunity in rural areas (Asaminew, 2007). Generally, there is no a well developed dairy marketing system in Ethiopia. This is reflected where only 5% of milk produced in rural areas is marketed as liquid milk (Getachew, 2003). This is due to the presence of limited marketing infrastructures such as transport.

According to (Ahmed, et al., 2003; Getachew and Gashaw, 2001) like other African countries (e.g., Kenya and Uganda), In Ethiopia also dairy products deliver and arrive at consumers through both formal and informal dairy marketing systems.

Formal milk markets does exist in urban and pre-urban dairy system of Shashemene–Dilla milk shed, and to Addis Ababa (Ahmed, et al 2003; Woldemichael, 2008). Cooperatives and private milk collecting and processing plants which collect milk from producer and deliver to retailers and consumers are participate in the formal marketing system, although there are few cooperatives and their performance are low (Woldemichael, 2008). The formal market was dominated by the DDE, which covers 12 percent of the total fresh milk in Addis Ababa until 1991 (Holloway, Nicholson, Delgado, Staal and Ehui, 2000). However, in recent time,

collecting, processing, packing and distributing milk and other dairy products have begun by private businesses. But, the formal market total production being marketed percentage remains small yet (Muriuki and Thorpe, 2001). In Ethiopia, the formal and informal market share and growth in the three phases has been different and the informal market has stay the dominant one (Ahmed, et al., 2003).

Due to the entrance of private sector in the dairy processing industry during last decade, the formal market appears to be expanding in Addis Ababa and Dire Dawa in the eastern part of the country (Ahmed, et al., 2003). Two different milk marketing methods use by the dairy producers in the rural lowland agro pastoral system of Mieso: traditional milk associations/groups and individual sellers. The traditional milk producer associations/groups are locally known as Faraqa Annanni, which includes women in its group who have milking cows or camels (Azege, et al., 2013).

According to (Getachew, 2003) in the informal market system, the smallholder sells his/her extra product to neighbors or in the local market either as liquid milk or in the form of butter or cottage cheese (Ayib) without the announcement of the government. It mostly take over in the rural areas of the country and part of pre-urban areas. The informal market includes delivery of milk from producer to consumer and traveling traders directly or it may pass through market agents (Ahmed, et al., 2003). The informal market system has a characterization of low operation cost, no licensing to operate, high producer price compared to formal market and no regulation of operations.

In Ethiopia, when smallholder farmers are merely close to formal milk marketing system such as government enterprises or dairy cooperatives, are fresh milk sales important (Holloway, et al., 2000). Farmers' milk marketing groups and dairy cooperatives play a significant role for milk marketing outlets, as a result farmers motivates to produce more (Zegeye, 2003).

2.3. Demand for Milk in Ethiopia

In Ethiopia, it is expected to increase milk sector for the coming ten to twenty years due to large potential for milk development in the country, the expected growth in income, and increased urbanization (Mohamed, Ahmed, Ehui and Yemesrach, 2004).

A report by (ILCA, 1993) showed that, until the year 2025 production should grow by 4%, the demand for fluid milk is to be met. There is a great opportunity and potential for the smallholder milk producer and for the development of milk production and processing industry in the country, due to increasing demand for milk and milk products. In Ethiopia, the per capita consumption of milk over the years is declining and the production of milk does not keep speed with the growing population (Ketema and Tsehay, 2004). To increase the quantity and quality of milk and milk products being offered to consumers, the milk industry needs to be optimized through organizing milk production, processing, preservation and marketing in a well coordinated way (Getachew and Gashaw, 2001).

There are many factors which can affect the demand for milk and milk products, including consumer preference, consumer's income, population size, price of the product, price of substitutes and other factors. The relationship of milk demand with the income and price is inelastic or negative, which means as the price or income increases, the demand for milk will decrease (Getachew and Gashaw, 2001). According to (Tanngka, Emerson and Jabbar, 2002) dairy products are not consumed during fasting seasons, and also on Wednesday and Friday among the followers of Ethiopian Orthodox Church. There are about 200 fasting days per year in the Ethiopian Orthodox church and most of the milk during this period is processed into Ayib and butter for later sales and consumption.

2.4. Milk Handling and Processing In Ethiopia

Most of the year Ethiopia has a hot climate and unless the milk is cooled, during this condition the raw milk is mess up. However, in some part of the rural area the cooling systems are not practicable. Besides, there are things like poor handling, pollution, technology applied which has low level in the conservation of milk to expand its shelf life and lack of market which create losses in the post harvest (Getachew, 2003).

In milk production, it is important and take in to consideration to clean up the store, the person who is involved in milking and the utensils used to collect and store milk. And also essential to cleaning of the udder before milking (Azege, et al., 2013). For collecting, storing and processing milk, dairy farmers used different milk utensils (Yitaye, Wurzinger , Azage And Zollitsch, 2009; Azege, et al., 2013). More farmers in urban used plastic utensils about 83 percent and the remaining 17 percent used aluminium utensils. In addition, there are farmers in urban who used gourd and clay pot utensils 33% and 21% respectively (Yitaye, et al., 2009). Milking procedures and cleanness of the milking utensils are one of the major factors affecting the quality of dairy products (Gonfa, Howard and Wilhelm, 2001). 94 percent of the farmers in urban and pre-urban milk production system are cleaned the udder before milking. But, there are farmers which cleaned the udder before and after milking, 6.7% and 5% urban and pre-urban farmers respectively.

Additionally, there are more farmers which clean milk utensils with cold or hot water and smoking with different aromatic plants like Woira (Olea africana) and Tid (Juniperous procera) in both urban and pre-urban production system. Cleaning the milk utensils using the above methods are believed to improve the quality and taste of milk and milk products, and expand the lifetime of dairy products. In urban and pre-urban production system, there are only about 23% of the producers which clean milk utensils using water and detergents. However, mostly at the pre-urban farms the water used especially from rivers for cleaning was uncertain quality. Due to this, the cleaning of udder and milking utensils might at danger (Yitaye, et al., 2009; Azege, et al., 2013). But, in the rural dairy system, it is not commonly practice to clean udder before milking. Across all the PLWs, the traditional home processing method is the dominant processing method and it processing fresh milk into fermented or sour milk, butter and local cheese (Ayib) (Azege, et al., 2013). This method is in general time consuming, verities of products was limited and less milk fat recovery turned into butter per unit of milk processed (Getachew, 2003). Due to the above reason, some farmers buy milk products such as butter and Ayib and usually sell all the fresh milk (Zelalem and Inger, 2000a cited in Azege, et al., 2013).

Farmers could not get the full value-added product from milk production unless the farmers produce varieties of products. This is one reason to comparatively low for urban dairy

producers to processing milk in to different by products such as butter and cheese (Sintayehu, et al., 2008; Holloway, et al., 2000; Yitaye, et al., 2009; Chamberlain, 1990 cited in Kasahun, 2008). Furthermore, when we compare the proportion of involved in processing milk in to cottage cheese, the pre-urban producers was slightly higher than of urban producers. Lack of fire wood availability for processing milk into cottage cheese and whey is another reason for urban producers not practicing this processing. Economically, the processing of milk into by-products using electric energy is favourable than the use of milk for household consumption. Milking across PLWs dairy production system is twice per day, except in the rural lowland agro pastoral production sub-system of Mieso while due to feed shortage during dry season milking frequency is reduced to once a day (Azege, et al., 2013).

2.5. Constraints to Milk Production

There are multiple factors which constrain dairy production, even the nature and magnitude of the problems different between production systems and agro-ecologies. Some factors are cross-cutting regardless of dairy production system and agro ecologies that can have influence on dairy production; others are system specific (Azege, et al., 2013).

The most important constraints associated with milk production as ranked according to their importance by the farmers were feed shortage, shortage of water, access to land, disease prevalence, poor genetic potential of local cows for milk production, inadequate artificial insemination services, and shortage of farm labor. The total production of milk in the areas are affects by the interaction of these constraints (Assaminew and Eyassu, 2009).

According to (Azege, et al., 2013) the dairy production system is highly constrained through shortage of feed in terms of quality and quantity. Insufficient supply of quality feed is the main thing restraining dairy efficiency in the region. Feed commonly based on hay and green plant are either absent in adequate quantities, or when exist, are low relating to diet quality (Ahmed, et al., 2003; Sintayehu, et al., 2008; Alganesh, Ulfina, Jiregna, Shiv And Mulugeta, 2013; Woldemichael, 2008; Getachew and Gashaw, 2001; Ketema and Tsehay, 2004; Belete, 2006). As a result, low milk and meat yields, high death of young livestock's, the time interval to give birth will longer and low animal weights (McIntire, et al., 1992 cited in Ahmed, et al., 2003). That's why, feed shortage has turn out to be a serious problem for those

who tend animals. The feed shortage is mostly face during the month between May and June as well as between December and February (Kedija, 2007).

The second most important constraint is shortage of water, most of the water sources, except channel for transporting water are found about 1 to 30 km from the households to vary according on the season (Kedija, 2007). In most of the study areas, the major constraint during the dry season is shortage of water (Azege, et al., 2013). To deal with the problem the water harvesting practice is not developed in the areas yet. Above and beyond that, the shortage of water is highly make worsen through lengthened dry seasons and repeated drought. The backward livestock watering systems which are performed at every two days and every three days during the dry and wet season respectively for cattle cannot adequately concentrate on the production of milk in the areas (Adane, 2009). Accordingly, the watering rate of occurrence of different types of livestock in various rural kebeles have suggested by the seasonal availability and distance of the water sources (Kedija, 2007).

According to (Azege, et al., 2013; Sintayehu, et al., 2008) land scarcity is also another major problem in urban and pre-urban dairy farming system. Livestock disease is also another one of the demanding factor for dairy development in the region. The trouble is more worsened with the either deficiency or unsatisfactory veterinary services (Alganesh, et al., 2013; Adane, 2009; Azege, et al., 2013; Getachew and Gashaw, 2001; Ketema and Tsehay, 2004; Belete, 2006). Almost all the households used traditional treatments, herbs, to treat their sick animals caused by inadequate veterinary service (Kedija, 2007). The main common diseases in the area are include trypanosomiasis, mastitis, dermatophilosis and anthrax (Assaminew and Eyassu, 2009). Different from Kenya, the great cattle population of Ethiopia has comparatively inadequate numbers of crossbreed dairy cattle (Ahmed, et al., 2003). The greater part of the farmers favor local cows saying that exotic animals are influenced to feed shortage and diseases. To get better milk production through exotic animals in the district has been no attempt (Kedija, 2007). Out of the 34.5 million cattle population of Ethiopia, Less than 1% are crossbred dairy cows (Muriuki and Thorpe, 2002). The largest part of milk and milk products are sourced dominantly by the native cattle breeds in Ethiopia (Azege, et al., 2013; Sintayehu, et al., 2008; Ketema and Tsehay, 2004; Belete, 2006). As compared to the potential, the contribution to the production has shown low productivity although the country

owns the largest livestock population. The result due to their low inherited capacity for particular product or lack of knowledge on the native breeds (Getachew and Gashaw, 2001).

The milk marketing system is not well developed in Ethiopia (Ahmed, et al., 2003) specially, in pastoral production system, market access is a vital factor (Tsehay, 2002). Where infrastructures are very restricted and market channel has not been developed, as a result, marketing fresh milk will difficult. The waste disposal is also another challenging factor for farmers. Urban production system has constrain through waste disposal. However, dung, can balance crop production in rural dairy production systems. Dung is a source of bad odor and hip, conflict may arise with neighbors, and diseases may pass from animal to human, if it is not properly managed (Azege, et al., 2013; Sintayehu, et al., 2008). In addition, farmers pay extra money for manual workers to clean the dung. Although, place is not assigned for disposing this animal dung (Sintayehu, et al., 2008).

Generally, milk requires a well-defined method of protection, and selling and delivery while milk is highly perishable and demands being high for urban consumption, competence in gathering and moving of this mass from broadly dispersed rural sources. The amount that would be available for consumption will be affected through losses in quality (Ahmed et al., 2003). The above constraints are encountered for the farmers, the cooperative dairy farmers are also faced many challenges. The most important constraints encounter by the dairy cooperatives were: lack of market access, low product price, less demand for dairy products especially during fasting time, lack of cooling facilities coupled with lack of electric power supply and frequent breakage of cream separator in their order of importance(Assaminew and Eyasu, 2009).

2.6. Opportunities

"In Ethiopia, there are ample opportunities for dairy development. The large and diverse dairy animals genetic resources adapted to the wide and diverse agro-ecologies, establishment of several structures and service centers such as veterinary health and artificial insemination (AI) centers, extensive service of agricultural extension, high demand for consumption of dairy products, huge human population with long-standing tradition of consumption of dairy products, high rate of urbanization and income growth, availability of

trained manpower, research institutions and technologies shows that the country has good opportunity for dairy development (Azege, et al., 2013)."

2.7. Empirical Evidence on Milk Production

There are small literature on the dairy production in Ethiopia. However, in this research, attempts have been made to review the available findings. Study conducted by different scholars on dairy production identified that number of dairy cows, education level of the dairy household head, availability of feed and costs, waste disposable problem, water shortage, poor access to veterinary service were found to be imperative to milk volume.

Study conducted by (Sintayehu, et al., 2008), on Dairy production, processing and marketing systems of Shashemene–Dilla area. They were used a multi-stage sampling techniques, with the objective of characterizing dairy production, processing/handling, marketing systems as well as to prioritize constraints and opportunities for dairy development in the area. A Rapid Market Appraisal (RMA) technique was employed. Dairy producers were interviewed using a pre-tested and structured formal questionnaire. Constraints for dairy development in the area included: availability and costs of feeds, shortage of farm land, discouraging marketing system, waste disposal problems, genotype improvement problem, poor extension and animal health services, and knowledge gap regarding improved dairy production systems.

The study done by (Adebabay, 2009), analyzed factors affecting milk production and marketing system in Bure District of the Amhara National Regional State. A single-visit multiple- subject survey was used to collect data on milk production & marketing systems. His finding indicated that, main problems of milk production & marketing were lack of feed, disease outbreak, lack of improved cattle breeds and distance to marketing points. However, he failed to take the milk nutrition, health, product marketing, input delivery and services and scaling up the feeding package into consideration in their study.

Research conducted by (Kedija, 2007), on the characterization of milk production system and opportunity for market orientation: a case study of Mieso district, Oromia region. The study was undertaken in five purposely selected rural kebeles of Mieso district; and these were Dire-kalu, Welda-jejeba, Hunde-misoma, Gena, and Huse-mendera. Farmers from each rural

kebeles were selected using Proportional Probability to Size (PPS) approach for each rural kebele. The sample households in each rural kebeles were stratified in to female and male headed households. For the market study, two market sites were purposively selected namely, Mieso and Asebot markets due to the accessibility of the area. She has been used a logit regression technique to analyze the result. Her finding indicated that, among the problems of dairy production in the area, seasonal feed and water shortage, security problem, and poor access to veterinary services were the major ones. In addition to this, low knowledge capacity and the limited number of the development agents were also reported to be common problems in the extension service. Nevertheless, the study did not consider the dairy production credit source.

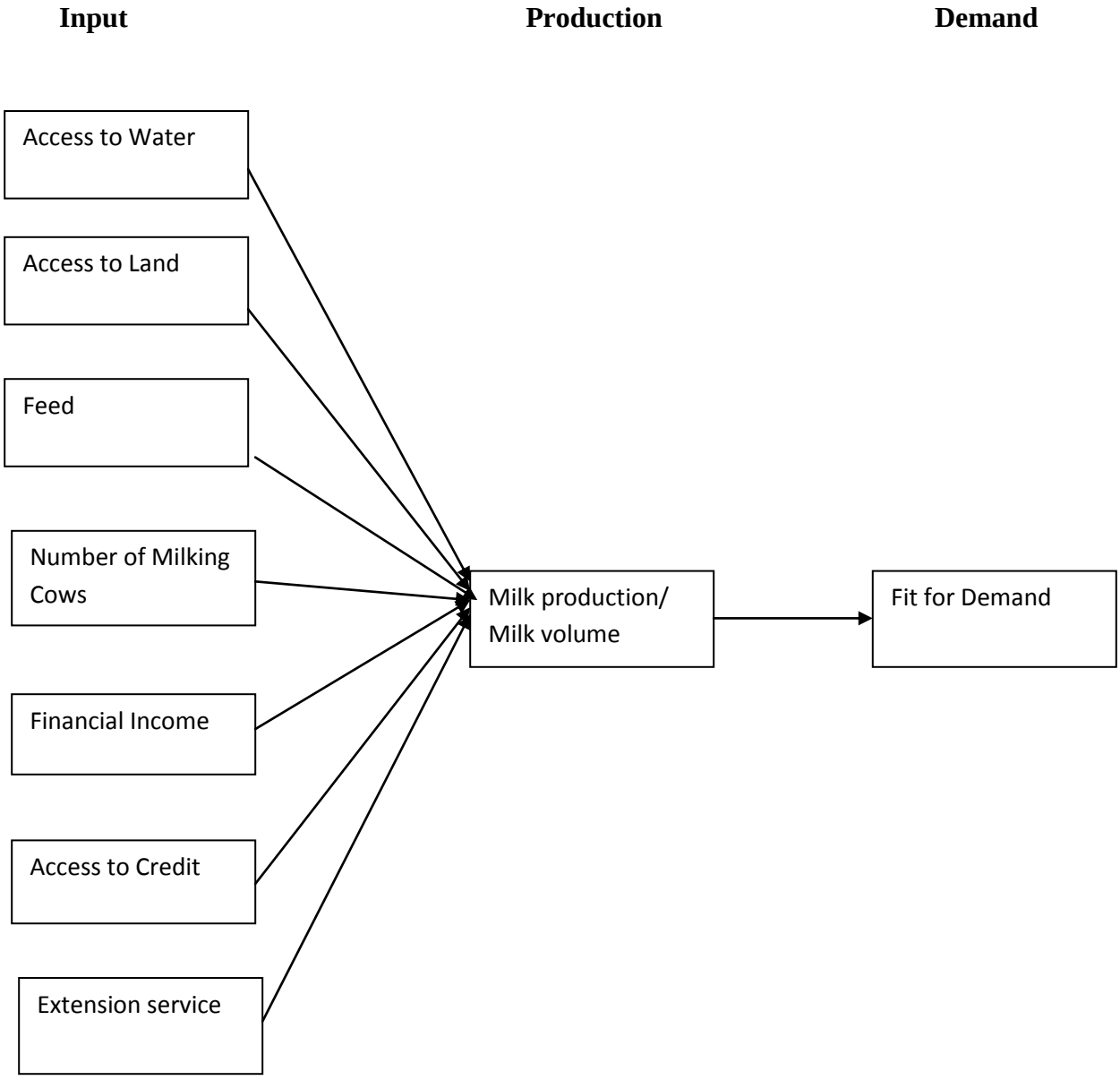
The study performed by (Alganesh, et al., 2013) also focus on Challenges and opportunities of milk production potential in western Oromia. Seven Towns, namely Ambo, Naqamte, Gimbi, Dambi-Dollo, Baddalle, Mattu and Jimma were purposively selected on the basis of their significance in the dairy production of the region. However, unavailability of improved dairy stock and in adequate AI services, shortage of feeds and cost of concentrates, disease challenges and price fluctuation in milk and milk products are some of the bottlenecks that requires systematic planning and intervention from all development practitioners.

2.8. Conceptual Framework

The conceptual framework of this study shows how the independent variables affect milk production (dependent variable). The independent variables consisting of number of milking cows, access to credit, financial income, feed, land size and water. The study assumed that independent variables have an influence on the milk production. The determinants (independent variables) in the conceptual frame work are selected after extensive literature review which depicted that out of many other factors that affect milk production these are the most important and relevant ones in the study. The frame work assumes that milk production is a net result of the positive and negative effects exerted by all the independent variables on the dependent variable (Milk production). Having a positive relationship among the variables show that production level of milk produce by both producers (smallholder dairy farmers and dairy cooperatives) will expected to increase. The independent variables are expected to have

a positive relationship with the dependent variable which is milk production or milk volume.

Figure 1: The relationship between input, milk production and demand (output).



Source: developed for the study

CHAPTER- THREE

RESEARCH METHODOLOGY

This section focuses on the research techniques employed in this study. It consists of data type and source, sample size and sampling techniques, data collection instruments, method of data analysis. For the purpose of this study, survey research design were implemented. This was because survey research design helps in collecting data from members of a population.

3.1 Site Selection and Description of the Study Area

As part of the background of the study it could be necessary to indicate some aspects of the city profile of Mekelle. Mekelle is a city in the northern Tigray Region of Ethiopia. It is located around 780 kilometers north of the capital Addis Ababa, at a latitude and longitude of 13°29′N 39°28′E respectively, with an elevation of 2084 meters above sea level. It is located in the northern high lands of Ethiopia, covering an area of 3500 hectares. Administratively, Mek'ele is considered a Special Zone, which is divided into seven sub cities. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this town has a total population of 215,914, of whom 104,925 are men and 110,989 women. 92.68% of the population said they were Orthodox Christians, and 6.03% were Muslim. Climate is characterized by relatively high temperatures and evenly distributed precipitation throughout the year.

Mek'ele is one of Ethiopia's principal economic and educational centers. Intercity bus service is provided by the Selam Bus Line Share Company. A new international standard airport, Alula Aba Nega Airport, was recently opened provides daily flights to Addis Ababa and other Ethiopian cities.

In recent years, Mekelle has experienced increased agricultural production due to improved farming techniques and a transition from subsistence to cash crop farming. There are numerous opportunities for investment in Mekelle. One area of particular interest is agriculture and agro processing. Livestock-based agro-processing can provide a myriad of opportunities for investors in the dairy, meat and leather industries. Total number of cattle in

Mekelle is 36,516; from this 25,369 are female cows and 9,014 are milking cows (BOUAD, 2009). There are 790 small enterprises which are participated in milk production. Mekelle is divided into seven local administrations namely Adi-haki, semen, kedamy- weyane, Hadnet, Quia, Hawelti, and Aider.

3.2. Data Type and Source

The research has used both qualitative and quantitative type of data in order to answer the research questions and thus arrive at concrete conclusions. The reason to use quantitative type of data was, after the response for the questionnaire were collected, the data were analyzed by using descriptive statistics such as percentages, frequencies. The data which were collected through open ended questions were analyzed qualitatively. Because the data which were gathered from the respondents was more subjective. Qualitative data used for the objectives of milk production system and the challenges and prospects of milk production. And Quantitative data was used for the objectives of milk marketing system and the way of milk handling processing. The researcher has also used both primary and secondary source of data. Primary data was collected via questionnaire from the five local administrations namely; Ayder, Hadnet, Hawlti, Qwhia and Semien. The questionnaire which were developed for small holder dairy farmers and dairy cooperatives focusing to identify number of milking cows, feeds, milk production, health and breed, milk handling and processing, marketing of milk, and major constraints and opportunities for milk production. The basic source of primary data was/ were those small holder dairy farmers as well as dairy cooperatives. Secondary data were gathered from articles, journals, and documents of the office of urban agriculture development of Mekelle city.

3.3. Research Strategy and Design

To achieve the objectives of the study, the research were designed with cross sectional survey design for the small holder dairy farmers and census design for the dairy cooperatives. With the survey research design, to analyze the collected data the researcher used a descriptive statistical method such as frequency and percentage. Cross sectional survey and census research design were developed based on the purpose of the study. It also had a mixed research strategy to collect the necessary data from the selected respondents using purposive

and census sampling technique. Because, the research focused on both qualitative and quantitative type of data.

3.4. Target Population and Sampling

3.4.1. Population

The population that is planned to be studied is known as target population. The target population of this research were small holder dairy farmers as well as dairy cooperatives of five local administrations in Mekelle. The total population that has been considered in this study was about 790 (770 of small holder dairy farmers, 20 of dairy cooperatives).

3.4.2. Sample Size and Sampling Technique

As cited by Muhammed, (2011) an important decision that has to be taken while adopting a sampling technique is about the size of the sample. Appropriate sample size depends on various factors relating to the subject under investigation like the time aspect, the cost aspect, the degree of accuracy desired, etc (Gupta and Gupta, 2002). If sample is too small, it might be difficult to achieve the objectives of analysis. But if it is too large, it may result in resource wastage when dealing with the sample. Sample error will arise because of not studying the whole population. Whenever sampling, it is usual to miss some helpful information about the population (Kothari, 1990). The higher the desired precision or the level of confidence, the larger will be the sample (Browen and Starr, 1983).

To make the study more accurate and viable, determination of appropriate number of sample size is important for the researcher. As a result, the researcher proposes (Yemane, 1967 cited at Israel, 2005) sample size determination formula as the best method of calculating sufficient amount of sample size for the study. According to Yemane, the best formula for sample size determination in case of finite population that would implement survey methods is as follows:

$$n = \frac{N}{1+N(e)^2}$$

Where N=Population size,

e=expected error (level of precision) and

n= sample size

Accordingly, the total population of small holder dairy farmers which available in five local administration were 770, the confidence level is 93% with 7% of precession or expected error since the respondents had homogeneous characteristics.

Thus, $n = \frac{770}{1+ 770\ (0.07)^2}$

$= \frac{770}{4.8}$

$= 160.4167 \sim 160$

Therefore, the sample size that the researcher deals with was 180 from among the total population of 790.

The target sample of the respondents were (160) out of the total population size (770) small holder dairy farmers has been selected conveniently with the intention that since the small holder dairy farmers are dispersed geographically, so, all the small holder dairy farmers were not found during the questionnaire distribution, and all the dairy cooperatives (20) available in the five local administration were made to fill the questionnaire. The number of farmers from each local administration were determined using proportional probability to size (PPS) approach, because the number of household in different local administration was different, so that to be more representative PPS was appropriate. Therefore, approximately 21% respondents were selected from each local administrations (Summarized in table 1). The target sampling population for this study were small holder dairy farmers as well as dairy cooperatives that owned milk cows and involved in production. The selection was make conveniently.

The main subject of discussion of the study was, number of milking cows, feeds, production, health and breed type, milk handling and processing practices, marketing of milk, and major constraints and opportunities for milk production were addressed in the study.

Table3.1. Total number of small dairy farmers and dairy cooperatives and number of sample dairy producers from five local administration.

No.	Local administration	Total small dairy farmers	Dairy cooperatives	Sample small dairy farmers	Total sample respondents
1	Ayder	164	5	34	39
2	Hadnet	120	3	25	28
3	Hawelti	165	6	34	40
4	Qwiha	81	___	17	17
5	Semien	240	6	50	56
	Total population	770	20	160	180

Source: Office of the Urban Agriculture Development (BOUAD) of Mekelle, 2013.

3.5. Data Collection Instrument and Field Work

To assess the milk production of the study area, preliminary visits or panel study were made before statement of the problem development which is important to the objectives of the study. For this study, both primary and secondary data were used. Primary data was gathered via a questionnaire. Partially developed semi structured questionnaire was used to collect data from sample respondents. The questionnaire contained open-ended questions that allow the respondents to express their opinions on various issues that have been presented in narrative analysis technique. The researcher distributed the questionnaire to the small holder dairy farmers as well as dairy cooperatives. The questions were semi structured which making it easy to complete and easy for analysis. The questionnaire was developed first in English and then has been translated in to Tigrinya language. The data collection was administered by the researcher.

The following procedure was pursued to administer questionnaire to respondents. First, the researcher approached potential respondents to ask their cooperation in filling the questionnaire and explained the purpose of collecting data, how the questionnaire will be filled and the confidentiality of to be obtained information. Then, the questionnaires were

distributed and respondents were asked to furnish information honestly and return the filled up questionnaire.

3.6. Data Processing and Methods of Data Analysis

The researcher used a statistical package for social science (SPSS) version 16 for analysis of data. The collected data has been coded and entered in to SPSS for analysis. The researcher used a descriptive statistics technique to analyze the quantitative data which has been collected from the respondents. This method of data analysis refers to the use of percentage and frequency. In addition to this, collected data's has been analyzed and expressed in tables. The researcher has been used a narrative analysis technique to analyze the qualitative data which has been collected from the respondents via open ended questions.

3.7. Description of Variables

3.7.1. Dependent Variables

Milk production (Milk Volume): it is dependent variable, it is measured by liter that represents the amount of Milk produced by the dairy farmers.

3.7.2. Independent Variables/ Input

Water: Having sufficient water for the dairy activity has a positive influence on milk production. Access to enough water has positive influence on preparation of improved feed, increment of number of cross breed cows therefore water positive impact on milk production.

Financial income from the non-dairy sources: The variable represents income originating from different sources other than dairy. Obtained by household head, spouse and other household members. Through improving liquidity, this income makes the household to expand production. It also strengthens the household position in coping with different forms of risks. Thus, income from non-dairy source is expect to affect production of milk positively.

Number of milking cows: This variable is independent and is expressed in number of milking cow owned. The milk volume is supposed to be positively influenced by the number of milking cows owned.

Feed: This variable has positive influence on milk production improvement. As the milking cows get enough feed, they will give more milk volume.

Land size: it is independent variable and measured by meter square. Large land size has positive influence on preparation of improved feed, increment of number of cows therefore land size positive impact on dairy production.

Access to credit: Access to credit is an independent variable. This variable is expected to influence the marketable supply of milk and milk market entry decision by dairy household positively on the assumption that access to credit improves the financial capacity of dairy households to buy more improved dairy cows, thereby increasing milk production.

3.7.3. Output

Demand for milk: High demand for dairy products or good access to market has a positive impact on increment of milk production. As the demand increase, the volume for milk will also increase.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Respondent Characteristics

About 68.8 % of the respondents were males and the rest 31.2 % were females respondents. This shows that majority of the respondents were males, are more involved in dairy production than females, this is males are getting better opportunity, independent financially and having power to make a decision than females.

The marital status of the sample respondents were married 41.2 %, widow 11.3 %, divorced 21.2 %, and single 26.3 %. Married respondents are highly involved in dairy production more than the others as they are doing things together and generate different ideas to involve in various businesses.

The age of the respondents were between, about 2.5 % between the age of 18-28, about 33.8% between the age of 29-39, about 46.8% of the respondents between the age of 40-50 and above 50 (16.9%). The majority age of the respondents were between 40-50 years. This indicates majority of respondents are in the age of 40-50 years, even though they are not young these age could also be productive in dairying, and the youngsters and highly productive individuals are not greatly involved in milk production, this might show that youngsters are failed to take a risk.

Education is an important point for the growth of communities and a tool to sustain development. In this context, educational level of the farming households may have significant importance in identifying and determining the type of dairy production. Education plays a great role in producers income, implementing technologies, as well as the socio-economic status of the family (Kerealem, 2005). In this finding, producers at elementary school level of education exceed the proportion of those at higher educational level. With respect to educational status of the respondents, the majority of dairy producers attended elementary school. The overall proportion of illiterate farmers was 19.4%, about 18.8% was in a category of read and write only, 43.8%, 15 % and 3% were elementary school, high

school and diploma and above respectively. The study results in general show that those dairy owners are mainly those who are able to read and write, primary and high school.

According to the respondents, the dairy activity is not the major occupation of the smallholder dairy farmers, about 51.9 % of the respondents said dairy farming was not their major job and the remaining 48.1 % of the respondents said dairy farming was their major occupation. So, most of the respondents who are participating in dairy framings are traders and individuals who are hired in informal sectors. The main motivator for involving in dairy activity was profitability. There were also other milk producers who involved in dairy activity due to having an experience and profitability.

In general, individuals who were highly involved in dairy activity in the study area were male at the age of 40-50. Those individuals education level also attended elementary school and had married marital status. Dairy activity was not the major job of this individuals; they were motivated to involve in dairy activity was due to its profitability.

Table 4.1: Respondent Characteristics

Activity		Frequency	Percent
Sex of the respondent	Male	110	68.8
	Female	50	31.2
	Total	160	100.0
Marital status of the respondent			
	Married	66	41.2
	Single	42	26.3
	Widow	18	11.3
	Divorced	34	21.2
	Total	160	100.0
Age of the respondent			
	18-28	4	2.5
	29-39	54	33.8
	40-50	75	46.8
	>50	27	16.9
	Total	160	100.0
Education level of the respondent			
	Illiterate	31	19.4
	Read and write	30	18.8
	Elementary school	70	43.8
	High school	24	15.0
	Diploma and above	5	3.0
	Total	160	100.0
Is dairy farm your major occupation			
	Yes	77	48.1
	No	83	51.9
	Total	160	100.0

Source: Own survey, 2014

4.2. Milk Production Systems

Based on their location, milk production systems can be classified into three: urban, pre-urban, and rural milk production systems (Tsehay, 2002). In the study area, milk production system can be classified in to two namely, urban milk production system and pre-urban milk production system. However, urban dairy production system dominates in Mekelle city. Pre-urban milk production system was mainly predominant in area of Mekelle city namely, in a few parts of Ayder, Hadnet, Hawlti, Qwiha, and Semien local administrations. It has a lesser number of cross breed cows. Accordingly, it contributes 31.1 % of the total milk production in the city. It is characterized by market orientation. The production system in the five local administrations is based on crop production.

The urban dairy production system was recognized in the four local administrations, namely Ayder, Hadnet, Hawlti, and Semien. It contains more number of cross breed cows. As a result, dairy producers in this production system contributes 68.9% of milk production in the city. The production system in the five local administrations is not based on crop production. Most dairy producers found in the four local administrations are smallholders with relatively to pre-urban parts higher composition of cross breed.

Table 4.2 : Milk production system

Activity		Frequency	Percent
Milk production			
	Urban	124	68.9
	Pre-urban	56	31.1
	Total	180	100.0

Source: Own survey, 2014

4.2.1. Work Experience in Dairy Activity

The length of work experience in dairy production of the respondent in the study area is between 6 and 10 years. This shows that dairy production starts to develop within the last ten

years. It seems that, the practice to produce dairy products in the study area was less developed; this is/was because of lack of understanding to produce dairy products in the study area, due to seasonal fluctuation of demand and supply, and due to less availability and quality of cross breed cows, which is appropriate for dairying. The majority (41.7 %) of dairy farm was established about 6-10 years ago, 7.2 % of proportion of farms established during the last 15 and above years, 20% of proportion was established about 11-15 years ago and 31.1 % of proportion was founded within the last 5 years (Table 4.2). This result indicates dairy producer has been encouraged to employ in dairy activity in recent times and dairy farming is a current growth in the area. Due to urbanization with population growth, demand will increase, as a result, profitability of dairy farming will increase, and this may be one of the major motivator to engage in dairying activities.

Table 4.3: Dairy Farming Experience

	Activity	Frequency	Percent
Working experience			
	Within last five years	56	31.1
	6-10 years	75	41.7
	11-15 years	36	20.0
	Above 15	13	7.2
	Total	180	100.0

Source: Own survey, 2014

4.2.2. Cattle Size and Breed Type

Out of the 34.5 million cattle population of Ethiopia, Less than 1% are crossbred dairy cows (Muriuki and Thorpe, 2002). In Ethiopia, indigenous cattle breeds are the dominant source of milk and milk products (Azege, et al., 2013). In the study area, the number of cows of the respondents were between one and six. With respect to cow breed composition from the total cattle size 1380, the proportion of cross breeds 1020 (73.9%) was more than the local breed 360 (26.1%) from total sampled respondents. In addition, all the respondents said that cross breed cows are more profitable than local breed cows. Due to the crossbreed has long

lactation time and higher amount of milk relative to local breed, accordingly production will increase and it shows that high production will occur if there is high number of cross breed as they are giving high milk per day than local breed. That's why about (65%) of the respondents said that, they did like to keep cross breed cows in the future than local breed cows, and around 35% of the respondents, did like to keep both cross breed and local breed cows in the future. This indicates that, cross breed cows are more profitable than local breed cows. However, due to the land and other constraints, the dairy farmers could not keep more of both local and cross breed cows. This is also a constraint for milk production. As the number of keeping cows increase, the supply for milk will increase. A different conclusion was given by (Azege, et al., 2013; Muriuki and Thorpe, 2002; Sintayehu, et al., 2008; Ketema and Tsehay, 2004; Belete, 2006) who found in different study areas the largest part of milk and milk products are sourced dominantly by the native cattle breeds in Ethiopia.

Table 4.4: Cattle Size and Composition

	Activity	Frequency	Percent
Cattle population	1-3	54	30.0
	4-6	49	27.2
	7-9	42	23.3
	Above 10	35	19.5
	Total	180	100.0
Cattle composition	Cross breed	1020	73.9
	Local breed	360	26.1
	Total	1380	100.0

Source: Own survey, 2014

4.2.3. Breeding System

Currently, AI service has been expanding to different parts of the country. However, the efficiency and effectiveness of AI service in general is quite low due to various constraints such as pregnancy rate to AI is low (Adebaby, 2009). About 23.9 % of the respondents used Artificial insemination for breeding, 34.4 % of the respondents used bull and 41.7 % of the respondents used a combination of AI and bull for breeding (Table 4.4). This shows that producers have sufficient alternative for their cows breeding system, which has positive role for the dairy production. According to the respondents, a problem for AI service is high. About 63.9 % of respondents said as they do face a problem of AI service but 36.1 % of the respondents said do not face a problem in AI service. The respondents said that the AI have a problem of shortage of semen, repetition and give a birth of only men ox. A similar conclusion was given by (Adebaby, 2009) who found in the area of Bure District the efficiency and effectiveness of AI service in general is quite low. However, this is not a problem at all. There are some cows, which are breeding through AI. That is why many of the respondents about 41.7% were interested to use a combination of bull and AI for breeding.

According to the respondents, about 41.7 % of them said that, they got AI service from government, 10 % of the respondent got AI service from private health centers, 13.9 % of the respondent got AI service from both government and private, and the rest 34.4 % of the respondent said as they had AI service problem, so that they did not used AI service rather they breeding through bull (Table 4.4). This show as the government gives a high contribution in the expansion and improvement of dairy production.

Table 4.5: Breeding System

Activity		Frequency	Percent
Means of animal reproduction	Artificial insemination	43	23.9
	Bull	62	34.4
	Both	75	41.7
	Total	180	100.0
AI problem	Yes	115	63.9
	No	65	36.1
	Total	180	100.0
Source of AI	Government	75	41.7
	Private	18	10
	Government and private	62	13.8
	Not applicable	25	34.4
	T0tal	180	100.0

Source: Own survey, 2014

4.2.4. Feeding System

Feed usually based on fodder and grass are either not available in sufficient quantities, or when available, are of poor nutritional quality. These constraints result in low milk and meat yields, high mortality of young stocks, longer parturition intervals, and low animal weights (McIntire *et al*, 1992 cited in Ahmed, et al., 2003). Feeding is the major input in dairy activity. Regarding the major feed source of the dairy producer, about 58.9% of the respondents were purchasing the feed from the crop farmers and other sources, 18.9 % of them harvesting the feed of cows and 22.2 % of the respondents using a combination of harvesting and purchasing feed. The reason why they are purchasing is that they do not have adequate land size for farming. According to 56.1% of the respondents, there was feed shortage mainly during March to October. Shortage of feed happened due to many reasons, it is due to lack of raw materials or ingredients for preparation of roughage, lack of enough

rainfall as Ethiopia's agricultural system is depend on seasonal rain, the feeds are not directly purchased from the factory rather than from merchants and also the cost of feed is very expensive in general as it is stated above. This situation might be major constraint for dairy production that might get attention in order to increase milk production. This finding is similar to the finding of (Sintayehu, et al., 2008) who found in the Shashemene-Dilla inadequate supply of quality feed and low productivity of the indigenous cattle breeds are the major factor limiting dairy productivity.

Table 4.6: Availability of Feed for milking cows

Activity		Frequency	Percent
Feed problem			
	Yes	101	56.1
	No	79	43.9
	Total	180	100.0
Feed type			
	Roughage, pasture and Attela	41	22.8
	Roughage, pasture and hay	66	36.7
	Roughage, hay, pasture and Attela	47	26.1
	Straw and Alfalfa	26	14.4
	Total	180	100.0

Source: Own survey, 2014

The majority 85.6 % of the respondents use different types of feed namely, roughage (Furshca), pasture, hay (dirqosh), and non usual feed like "Attela" as main feed for their milking cows and only 14.4% of respondents use improved feed like straw, alfalfa besides roughage, pasture and Hay. The same conclusion was given by (Assaminew and Eyassu, 2009) who found in the area of Bahir Dar Zuria and Mecha Woredas the major sources of feed for cattle in the study area were natural pasture, hay, crop residues and non-conventional feedstuffs (local brewery by-products).

4.3. Milk Marketing System

4.3.1. Demand for Milk

Milk and milk products form part of the diet for many Ethiopians. They consume dairy products either as fresh milk or in fermented or soured form (Getachew and Gashaw, 2001). In Ethiopia, it is expected to increase milk sector for the coming ten to twenty years due to large potential for milk development in the country, the expected growth in income, and increased urbanization (Mohamed, et al., 2004). In the study area, majority of producers about 92% of the respondents sell all of their milk products and the remaining about 8% of them use milk for home consumption only, however, the production could not meet the demand in the market mostly during non fasting seasons. This indicates that their production is less relatively to the market demand. As they are selling most of their products, the study known that the producers in the study area are market oriented.

Due to the presence of high demand for milk in the area, the producers did not process the milk in to another form such as butter except during fasting time when the whole milk was not sold. Although there is high utilization demand of milk in the study area, there are respondents who face a problem of less demand in fasting season. Out of the respondents, about 79.4% of the respondents were faced less demand, and about 20.6% of the respondents did not face demand problem. According to the respondents, about 66.7% of the respondents said demand problem for milk occurred during fasting time.

During fasting time, producers would have surplus milk and for unsold milk they will processes traditionally in to byproducts like butter and distribute in to calf's as a food. The same conclusion was given by (Tanngka, et al., 2002) who found dairy products are not consumed during fasting seasons and most of the milk during this period is processed into cheese (Ayib) and butter for later sales and consumption. As milk is perishable product, during the fasting time the milk also got spoilage. This is a problem for milk producers. This shows that the need for processing factory in the area is important to reduce the problem by increasing the shelf life of the milk. Other point, the available demand, and supply in the study area are not balanced, it is fluctuated from season to season or there is seasonality of

demand for milk. During fasting time, the available milk is more than the demand and out of the fasting time, the supply does not satisfy the demand in the market.

Table 4.7: Milk Demand Problem

	Activity	Frequency	Percent
Marketing problem			
	Yes	143	79.4
	No	37	20.6
	Total	180	100.0
Month of problem			
	Fasting month	120	66.7
	In any month of the year	23	12.8
	Not applicable	37	20.6
	Total	180	100.0

Source: Own survey, 2014

4.3.2. Channel of Milk

The market channel of milk and milk products vary based on production system and type of the dairy product produced (Azege, et al., 2013). There are two marketing systems in Ethiopia, the formal (which caters for collection and processing of milk that is safe for human consumption) and informal (direct sale of whole and fresh milk to consumers) (Getachew, 2003). The majority of respondents sold their products to household consumers, and cafe at home and home to home selling mainly on contract basis (Table 4.7). This practice indicates the dairy marketing system found in the studied areas was dominantly informal marketing. The consumer may not get dairy products easily in the current marketing system rather by going to the producers' home, which is uncomfortable for doing business. Even though urban and pre-urban milk production system exists in the study area, informal marketing system was dominated. This finding is contradict to the finding of (Woldemichael, 2008) who found in the area of Shashemene, Hawassa and Dale milk shed formal milk markets does exist in urban and pre-urban dairy system.

Majority of the respondent's 26.7 % sold their milk directly to the household consumers and cafes either at the producers home or home to home selling, 12.2% sold to the household consumers, 22.8% sold to cafe, 10% sold to the household consumer and retailers, 10 % sold to the retailers (Table 4.7). Individual consumers or cafes usually buy milk and by moving to producers home, as well as bringing by the producers to their home through home to home selling. The least beneficiary of milk from producers were retailers and cafe was 6.1% amount in the study area. Majority 52.8% of producers sold their milk in a contract basis, about 25% of the respondents sold their milk in a daily sell basis, and 22.2% of the respondents sold their milk based on the combination of both a contract and daily sell basis.

Table 4.8: Consumers of Milk

Activity		Frequency	Percent
Consumer			
	Household consumer	22	12.2
	Retailers	18	10.0
	Caf'e	41	22.8
	Household consumer and retailers	18	10.0
	Household consumer and caf'e	48	26.7
	Retailers and caf'e	11	6.1
	Household consumer, retailers and caf'e	22	12.2
	Total	180	100.0
Sell method			
	On contract basis	95	52.8
	On daily sell basis	45	25.0
	Both	40	22.2
	Total	180	100.0

Source: Own survey, 2014

The number of intermediaries in a given marketing channel will have a bearing effect on both producer and consumer milk prices. The shorter the channel the more likely that the consumer prices will be low and the producer will get a higher return (Woldemichael, 2008). Producers delivered their milk to the customers about 37.8% by moving to customers home (home to home selling); this finding is similar to the finding of (Woldemichael, 2008) who found in the area of Shashemene–Dilla delivery to buyer was the most important milk marketing channel, 20.6% of the respondents sold their milk at home, 4.4% delivered their milk by opening the distribution center, 5.5% sold their in their home and by opening a

distribution center, 25% of the respondents sold their milk at their home and by moving to the customers home (home to home selling) and 6.7% of the respondent sold their milk by both opening a distribution center and home to home selling.

Table 4.9: Distribution Channel

Activity	Frequency	Percent
Selling place		
Home	37	20.6
Distribution center	8	4.4
Home to home selling	68	37.8
Home and distribution center	10	5.5
Home and home to home selling	45	25.0
Distribution center and home to home selling	12	6.7
Total	180	100.0

Source: Own survey, 2014

4.4. Access to Services

4.4.1. Access to Land

Land is one of the important input for dairy farming. According to the respondents, about 53.3% were said that they do not have enough land for dairy farming and the remaining 46.7% of the respondents said that they have enough land for dairy farming; particularly dairy cooperatives are the main respondents that have enough land in the study area. The dairy producer recognized that small farmland size as a serious problem and constraints for expansion of dairy farming. This finding is similar to the finding of (Woldemichael, 2008) who found in the area of Shashemene, Hawassa and Dale milk shed that shows shortage of land for dairy farming and feed production is a major problem in urban and pre-urban dairy farming system. The same conclusion was also given by (Sintayehu, et al., 2008) who found in the Shashemene-Dilla access to farm land as the second important constraint that hindered dairy development in the area. As it is discussed in the above section of cattle size, due to

land constraints, the supply of milk by the producer is not sufficient for the demand in the market. Therefore, when the number of cows increases the demand for land will increase. Besides, as it is discussed in the above section of feeding system, the major source of feed is purchasing from the crop farmers, and the cost of feed is expensive, thus land is important to prepare improved feed by planting different types of grass like alfalfa, straw for milk production increment and minimize cost of feed to be purchased.

Most producers about 54.4% kept their cows detached from their own residence compound. Even if dairy producers are interested to expand their dairy farm, the land size may not allow them to do so. As land size increases more and more facilities become inevitable that take-up space other than the animal shelter. About 45.6% of the respondents kept their cows out of their own residence or the cows have their own residence. The respondents who kept out of their residence compound has large number of cows, the shelter constructed in a modern way relatively and it is suitable for cleaning, watering, feeding and other activities can be easily handled. Above and beyond, some producers dispose animal dung out of their place, this is because of small size land. However, even though generally there was small land size in Mekelle city, there were two local administrations which have enough land namely, Hawelti and Semien local administrations. The remaining three local administrations namely, Ayder, Hadnet and Qwiha did not have enough land and faced a constraint in the increment of milk production.

Table 4.10: Access to Land

Activity		Frequency	Percent
Access to land			
	Yes	84	46.7
	No	96	53.3
	Total	180	100.0

Source: Own survey, 2014

Table 4.11: Access to Dairy Farm Land Cross tabulation

		do you have enough land farm		
		Yes	No	Total
local administration	Ayder	18	21	39
	Hadnet	9	19	28
	Hawelti	22	18	40
	Qwiha	5	12	17
	Semien	30	26	56
	Total	84	96	180

Source: Own survey, 2014

4.4.2. Access to Water

In the low rainfall areas like Mieso where there is plenty of underground water resource, water resource development is crucial to dairy production (Azege, et al., 2013). Water is the basic element for milk production. Even if all the necessary inputs are available for the milking cows, having sufficient water is important for the dairy farming. The majority of the respondents 53.9% have not sufficient water for their milking cows mainly, during dry season; this finding is similar to the finding of (Azege, et al., 2013) who founds access to water during the dry season is a major constraint in most of the study sites and the remaining 46.1% of the respondents have sufficient water for their milking cows. The majority 81.3 % of the respondents use tap water and well water source of water and only 18.7% of respondents use a combination of river, well and tap water as source of water. Lack of sufficient water might be major constraint for milk production that might get attention in order to increase and expand milk production. Additionally, according to the respondents who said they had lack of water, the cross breed cows are not drinking a river water because river water is not cleaned water rather cross breed cows drunk a cleaned water especially from tap water and well water. So, this is a constraint for the milk producers from doing their dairy activity properly as they kept a crossbreed cows. Since, the producers are located in the same area and uses a tap water, the government should help them to dipping out an irrigation to solve the problem of water. However, even though generally there was shortage of water

in Mekelle city, there were two local administrations, which have sufficient water namely, Qwiha and Semien local administration. The remaining three local administrations namely, Ayder, Hadnet and Hawelti did not have sufficient water and constrain for increment of milk production (Table 4.11). These five local administrations also mainly use a tap and well water, which means both urban and pre-urban production system use a tap and well water. However, this finding is different from the finding of (Yitaye, et al., 2009) who found the sources of water which the farmers had access to, were significantly different for the two production systems: while almost all (94.7%) of the farmers had access to tap water in the urban areas, water from wells (18.1%) and rivers (17.6%) was also used in the pre-urban locations.

Table 4.12: Availability to Sufficient Water

	Activity	Frequency	Percent
Access to water			
	Yes	83	46.1
	No	97	53.9
	Total	180	100.0

Source: Own survey, 2014

Table 4.13: Availability to Sufficient Water Cross tabulation

		do you have sufficient water for the cattle		
		Yes	No	Total
local administration	Ayder	17	22	39
	Hadnet	9	19	28
	Hawelti	16	24	40
	Qwiha	12	5	17
	Semien	29	27	56
	Total	83	97	180

Source: Own survey, 2014

4.4.3. Access to Health Service

Diseases in dairy animals affect reproduction, milk production, milk quality and cause mortality and morbidity (Azege, et al., 2013). Majority (87.8%) of the respondents have an access to animal health from the Government (73.5%) and privatively (14.3%) with reasonable cost. This indicates government has a great contribution in giving genetic improvement and animal health care. However, 12.2% of respondents faced lack of access and high cost to get animal health service (Table 4.12). There is good opportunity and future prospect to animal health, which is important for productivity of milking cows. The government gives high attention to improve the dairy farming by making veterinary service available with reasonable cost. The finding is different from the finding of (Yonada) who found prevalence of major livestock diseases, limitations in veterinary services and disease control are the major constraints of milk production in pastoral areas.

Table 4.14: Access to Veterinary Service

	Activity	Frequency	Percent
Veterinary	Yes	158	87.8
	No	22	12.2
	Total	180	100.0

Source: Own survey, 2014

4.4.4. Extension Service

With regard to extension service, extension employees are the one who are providing the service appointed by Bureau of urban agricultural development of Mekelle, the result of this study discovered that the contact of development agents with milk producers was frequent and regular. In this regard 51.1% of the respondents said they have access to extension service; this finding is similar to the conclusion given by (Woldemichael, 2008) who found in the urban and pre-urban dairy system of Shashemene, Hawassa and Dale milk shed, some dairy producers receive dairy production extension services and the remaining 48.9 % of the respondents said they have no access extension service. The extension service is provided by

the government especially by the Bureau of urban agricultural development (BOUAD) of Mekelle twice in a month (Table 4.13). Other governmental institutions like office of trade and industry, office of small and micro enterprise are also play a great role in dairy activity by providing informational support. The extension employees gave training to the milk producers regarding to the dairying activities. Among the trainings given by the extension employees to the producers are, producers have got various information regarding dairy farming activity; these include how to manage milk cows properly, breeding system, and use of artificial insemination, improved feeding and preparation, health care and how to process at the time of milking. The study discovered the role of government is great in providing training and technical support; therefore dairy producers have opportunities to use extension service and be relevant in their dairy farm to be more productive. However, even though generally there was access of extension service by government in Mekelle city, there were two local administrations which have lack of sufficient access for extension service namely, Hawelti and Semien local administration. The remaining three local administrations namely, Ayder, Hadnet and Qwiha have sufficient access of extension service by the government, which play a positive role in expansion and increment of milk production (Table 4.14).

Table 4.15: Extension Service given for Milk Producers

Activity		Frequency	Percent
Extension service	Yes	92	51.1
	No	88	48.9
Total		180	100.0

Source: Own survey, 2014

Table 4.16 : Extension Service given for Milk Producers Cross tabulation

		Extension service given for cattle		
		Yes	No	Total
local administration	Ayder	27	12	39
	Hadnet	15	13	28
	Hawelti	13	27	40
	Qwiha	11	6	17
	Semien	26	30	56
	Total	92	88	180

Source: Own survey, 2014

4.4.5. Access to Credit

Access to credit for financing investment and expand dairy farm operations is essential to the commercialization of smallholder dairy farming (Azege, et al., 2013). However, the survey result highlighted that producers' willingness or need for credit was high but, access of credit for milk production was low in the surveyed local administrations. In this respect, out of the respondents, 77.2 % have a need for credit service and the remaining 22.8% of the respondents does not have a need for credit service. The main reason for not taking credit was the difficulties of financial institution, credit is not given individually, and interest of the credit is also too high. These respondents have wished to add more cows if they get access credit to finance their dairy farm. In the other side access to credit, 36.7% of the respondents have access to credit; particularly dairy cooperatives are the main user of credit in the study area, 40.5% of the respondent did not have access to credit mainly the small holder dairy farmers, and the remaining 22.8% of the respondents did not apply the question, because they do not need to take credit. The same conclusion was given by (Azege, et al., 2013) who found access to credit in the study area is generally low. This shows that producers might be limited to expand their dairy activity in order to increase milk production due to their lack of mainly, credit access. Even if the availability of credit is not enough, the main credit sources of the sample respondents were DEDEBIT Micro finance, REST, UNDP and other sources.

Table 4.17: Access to Credit Service and Respondents need for Credit

Activity		Frequency	Percent
Need for credit			
	Yes	139	77.2
	No	41	22.8
	Total	180	100.0
Access to credit			
	Yes	66	36.7
	No	73	40.5
	Not applicable	41	22.8
	Total	180	100.0

Source: Own survey, 2014

4.5. Milk Handling and Processing

In milk production, it is important and take in to consideration to clean up the store, the person who is involved in milking and the utensils used to collect and store milk. And also essential to cleaning of the udder before milking (Azege, et al., 2013). In the study area, about 73.9 % of the respondents were clean the udder during milking. The producers were cleaned the udder before and after milking by cold water. This finding is similar to the finding of (Yitaye, et al., 2009) who found in North Western Ethiopian highlands that shows the udder was cleaned during milking. And the remaining 26.1% of the respondents were not clean the udder during milking, this may due to lack of training in how to process and handle during milking.

More farmers in urban used plastic utensils and aluminium utensils. In addition, there are farmers in urban who used gourd and clay pot utensils for collecting and processing milk (Yitaye, et al., 2009). However, in the study area the finding is different from the finding of (Yitaye, et al., 2009), there were no producers who used an utensil for collecting and processing milk rather they handle and process it through their hand by using a glove as shown in (Table 4.16). This may one of the major factors which affecting the quality and lifetime of milk. As (Gonfa, et al., 2001) said, milking procedures and cleanness of the

milking utensils are one of the major factors affecting the quality of dairy products. The dominant milk processing method in the study area was traditional processing method and it involves processing fresh milk in to butter and cheese (Ayib).

Table 4.18: Clean the Udder during Milking and Its Tools

Activity		Frequency	Percent
Clean udder			
	Yes	133	73.9
	No	47	26.1
	Total	180	100.0
Utensil			
	No	180	100.0
	Total	180	100.0

Source: Own survey, 2014

4.6 Constraints and Opportunities of Milk Production

4.6.1. Continuity and Further Processing

With regard to continuity, the majority of milk producers about 89.4% in the study area were willing to continue and expand the dairy farm in the future for many reasons. The rest 10.6% of the respondents were not willing to continue and expand dairy farm in the future. Among the reasons are there is a rapid urbanization, extensive population growth and change in the living standard of the societies in the study area, the demand for milk will increase in the future. The other reason is, the dairy farm is a profitable sector. Because the demand for milk is expected to increase, the profitability of the dairy farm sector will also be expected to increase. Among the producers who are interested to continue in dairy farm, about 75.6% have an intention for further processing and the rest 24.4% of the respondents does not have an intention for further processing. Until now the producers sold the fresh milk without processing in to further, however, in the future the producers have an intention to process it through opening a factory. This may not be possible currently at individual level, because about 90% of the respondents did not have enough income to perform a dairy farming. But, in future they are interested to process it by bringing the machinery at cooperative level. This

is because, as it is discussed in the above section of demand for milk during fasting time the demand for milk were decreased and the milk also got spoilage. So, to avoid this problem the producers are willing for further processing of the fresh milk.

Table 4.19: Availability of Adequate Income, Further Processing and Continuity in Dairy Farming

Activity		Frequency	Percent
Continuity			
	Yes	161	89.4
	No	19	10.6
	Total	180	100.0
Further processing			
	Yes	136	75.6
	No	44	24.4
	Total	180	100.0
Income			
	Yes	18	10.0
	No	162	90.0
	Total	180	100.0

Source: Own survey, 2014

4.6.2. Constraints of Dairy Products

According to the respondents, there were different constraints in dairy production. The major constraints dairy development in the area were: shortage of feed, high costs of feeds, seasonality of milk demand occurred due to fasting season, lack of formal marketing systems, inadequate land for dairy expansion and preparation of feeds, AI problem, lack of income, shortage of water, lack of handling tools, knowledge gap in identifying quality cross breed, even though there is an access for extension service there is a problem of extension service in some local administration, lack of processing factory and access for credit for expansion. The degree and significance of the problems and constraints differed among the producers in the study area. This finding is similar to the finding of (Ahmed, et al., 2003; Assaminew and Eyassu, 2009; Sintayehu, et al., 2008; Adebabay, 2009; Shamsuddoha and Edwards, 2000) who found in different areas that shows the dairy production was constrained by insufficient supply of quality feed and its high cost, access for credit, seasonality of demand particularly in fasting time and lack of processing industry.

4.6.3.Opportunities for Dairy Products

Milk production gives a lot of opportunities for smallholder farmers to use land, labor and feed resources and make regular income. In this case, support services in terms of accessing adequate land, organizing input supplies (improved genetic material, feeds, AI, drugs), provision of credit, extension and training services, production and entrepreneurial skills development, sound market opportunity and linkage are the key elements of success for the milk industry (Sintyehu et al., 2008).

Even though many constraints that may obstruct the increment of the milk production were identified in the study area, the majority of dairy producers in the study area were willing to continue and expand dairy farming in the future. In general, the respondents in the study areas were more willing to continue and expand dairy farm due to high demand in the area. Because of the rapid urbanization, extensive population growth and change in the living standard of the societies in the study area. There is also an opportunity to perform dairying in cooperatives as the government gave enough land and credit based on the stated condition. Dairying gives the opportunity for dairy producers to generate income as it is highly demanded product. It is also highly profitable sector. There are also another opportunities for milk producers concerning to accessing adequate land and credit for dairy cooperatives, animal health service, AI service, and extension and training services.

CHAPTER FIVE

CONCLUSIONS AND RECOMENDATION

5.1 Conclusion

This study was conducted with the objective to Explore the challenges and prospects of Milk production in Mekelle city of Tigray Region. The study was undertaken in the five local administration of Mekelle city; namely Ayder, Hawlti, Hadenet, Qwhia and Semien. Dairy farmers from each local administration were selected using Proportional Probability to Size (PPS). Data were collected from 160 small holder dairy farmers and 20 dairy cooperatives using semi structured questionnaire. Survey data collected from five local administrations was analyzed by using descriptive analysis and qualitative data was analyzed through narrative analysis technique.

Two major milk production systems, namely the urban and pre-urban milk production systems were identified in the study area. Dairying was found as a good source of income for urban and pre urban producers as they are selling their dairy products primarily. The major feed resources identified in the area included, hay (Dirkosh) and roughage (Furshca), pasture, and non usual feed like "Attela". The major feed source of the dairy producer were purchasing the feed from the crop farmers. However, there was feed shortage mainly during March to October due to many reasons such as lack of raw materials or ingredients for preparation of roughage, lack of enough rainfall, cost of feed is very expensive. The majority 34.4% of producers used natural mating by bulls, while 23.9% of the producers used AI as a means of breeding system and 41.7% of producers used both method as a means of breeding system. Producers got AI service from government and private. The producers in the study area did not have enough and sufficient land and water for performing the dairy activity.

Informal dairy marketing was the pre dominant means of marketing system in the study area and there is no milk processing plant in the city. Majority of producers about 92% of the respondents were sell all of their milk products. The producers sold their milk directly to household consumers and cafes either at the producers home or home to home selling. Nonetheless, The producers did faced high demand problem during the fasting season.

In the study area, there were no producers who used an utensil for collecting and processing milk rather they handle and process it through their hand by using a glove. This can affect the quality and lifetime of milk. The fresh milk was processed in to butter and cheese (Ayib) for later sales. In addition, the available number of milking cows, access for water, access to credit and income, extension service has also seen as they have significant influence on milk production.

From the study it was noted that the existing milk production systems were affected by many constraints. The major constraints for dairy development in the area includes shortage of feed, high costs of feeds, inadequate land for dairy expansion and preparation of feeds, seasonality of milk demand occurred due to fasting season, lack of improved breed animals with affordable price, less access for credit, AI problem, shortage of water and knowledge gap in identifying quality cross breed. The rapid urbanization, extensive population growth and change in the living standard of the societies in the study area, to generate income as it is highly demanded product, highly profitable sector accessing animal health service, AI, extension and training services is an opportunity for the development of dairy in the area. Dairy development in the studied areas can be improved by encouraging private investors and cooperatives to establish dairy processing plant, and thereby pre-urban and urban producers could be encouraged to enter into milk collection systems.

5.2 Recommendation

Based on the results of this study, the following recommendations are outlined.

As it was seen in the analysis, the producers have a knowledge gap in identifying quality cross breed, the government should make an arrangement for quality cross breed. As shortage of feed and its cost was the major constraint for dairy production, the government (Office of Urban Agriculture Development and office of Trade and Industry) should supply a feed for the milk producers so as to motivate the milk producers.

As it has been discussed in the analysis part, the demand for milk is decline during the fasting season and there is a shortage of feed mainly during March to October, so, the mismatch between seasonal production and demand in the study area identify the need for processing facilities that would produce storable dairy products such as milk powders or hard cheeses using latest technology like "Mama Wetet". The government and other concerned bodies should pay due attention to develop formal milk marketing systems. Milk production level could be enhancing by increasing the capability of smallholder dairy farmers.

As it was seen in the analysis part and respondents said, access to water, land, credit, financial income, feed and number of milking cows have positive and significant impact on milk production, so, to improve the milk production the government and concerned bodies (Office of Urban Agriculture Development and office of Trade and Industry) should to give a due attention for enough availability of the above variables. Besides, the government and concerned bodies should create an awareness for milk producers about the tools (utensil) which used for handling and processing milk.

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Appendix

Mekelle University

College of Business and Economics

Department of Management

Master of Business Administration Program

Questionnaire on the* challenges and prospects of dairy production*: In case of Mekelle city

Dear respondent;

The purpose of this questionnaire is to collect information about the **challenges and prospects of dairy production** in Mekelle city. This study is conducting for the partial fulfillment of the requirements for master of business administration, on the title of "**Exploration towards challenges and prospects of dairy production"** in Mekelle city. Since, you are the one who can give a true picture about the challenges and prospects of dairy production, the researcher requests you to respond to the questions.

Your response will be confidential and I guarantee you that it will never be disclosed to a third party. Only it will be used for academics purpose. Your genuine response to the questions will have great role to the outcome of the final research project.

General instructions

- Please encircle on the appropriate alternative that represents your feeling towards the question.

Thank you for your cooperation!!!

Questionnaire on challenges and prospects of dairy production.

GENERAL

Local administration (sub city)_____

I-Respondents Characteristics

1. Sex of respondent: 1. Male 2. Female

2. Marital status: 1. Married 2. Single 3. Widow 4. Divorced

3. Age of the respondent: 1. 18-28 2. 29-39 3. 40-50 4. above 50

4. Educational level of the respondent:

   1. Illiterate 2. Read and Write 3. Elementary school

   4. High school 5**.** Diploma and above

5. Is the dairy farm your major occupation? 1. Yes 2. No

6. If the answer for question no. 5 is no, what is your major occupation?

   1. Civil servant 2. Trader 3. Informal sector 4. Other specify_____

II- Milk Production System

1. What is your production system?_____

2. How many milking cows population do you have?

   1. 1-3 2. 4-6 3. 7-9 4. above 10

3. How long have you been engaging in milk production?

   1. Within last 5 years 2. 6-10 years 3. 11-15 years 4. Other specify_____

4. What motivates you for investing in dairy farming? (multiple answers are possible)

   1. Profitability 2. Supplement consumption for family

   3. Part time job 4. Other specify_____

5. The basis of your dairy cows

   1. Purchased 2. Inherited from family 3. Both 4. other, specify_____

6. Place of origin of cows (where are the cows come from?) (multiple answers are possible)

1. Mekelle 2. Outside Mekelle with the region 3. Outside the region

4. combination of the above specify 5. Other, specify_____

7. Breed type

1. Local 2. Cross bred 3. Both

8. Which breed type is profitable?

1. Indigenous 2. Exotic 3. Both

9. Which breed of milk cows do you like to keep in the future?

1. Local 2. Crossbred 3. Both

10. What method do you use for animal reproduction (breeding system)?

1. Artificial insemination 2. Bull 3. Both 4. Other, specify_____

11. If you use Artificial insemination, what is the source of it? (multiple answers are possible)

1. Government 2. NGO's 3. Private 4. Others, specify _____

12. Is there a problem of Artificial insemination? 1. Yes 2. No

13. If the answer for question no. 12 is yes, what is it? (multiple answers are possible)

1. No access 2. Unwillingness of AI technicians'

3. Shortage of semen 4. Others, specify _____

14. Feed types of milking cows? (multiple answers are possible)

1. Roughage 2. Straw 3. Pasture 4. Hay

5. 'Attela' 6. Combination of the above specify 7. Other, specify_____

15. Source of feed:

1. Own 2. Purchased 3. Both 4. Other, specify_____

16. Is there a problem of feed shortage for milking cows? 1. Yes 2. No

17. If the answer for question no. 16 is yes, when? _____

18. What are the main reasons for the shortage of feed in the area?

_____

_____

_____

III. Milk Marketing System

19. For what purpose do you use cattle dung? (multiple answers are possible)

1. Sell 2. Fertilizer 3. Fuel 4. Other, specify_____

20. When did you start selling milk?_____

21. Is there any period that you have marketing problem for your milk products?

1. Yes 2. No

22. If the answer for question no. 26 is yes, which months?

1. Fasting month's 2. In any month of the year specify_____

23. What do you do for unsold milk? (multiple answers are possible)

1. Self consumption 2. Distribution to relatives

3. Convert in to byproducts 4. Other specify_____

24. Who are the major consumers of milk in the market? (multiple answers are possible)

1. Household consumer 2. Retailers 3. Cafe's 4. Other specify_____

25. How do you sell your milk?

1. On contract basis 2. On daily sell basis

3. Both 4. Other, specify_____

26. Select your selling place for the milk. (multiple answers are possible)

1. At home 2. Distribution center

3. Home to home selling 4. Other, specify_____

27. Do your product satisfy the demand of the market? 1. Yes 2. No

28. Do you think that the supply of milk in Mekelle is enough to the demand?

1. Yes 2. No

29. If the answer for question no. 33 is no, why?

_____

_____

_____

IV. Milk handling processing

30. Do you use an utensil to milking? 1. Yes 2. No

31. Do you clean the udder before and after milking? 1. Yes 2. No

V. Access to Services

32. Do you think that you have sufficient water for the milking cows? 1. Yes 2. No

33. Select source of drinking water for the milking cows. (multiple answers are possible)

1. Tap water 2. Water well 3. River water 4. Other specify_____

34. Do you think that the land farm size you have is enough? 1. Yes 2. No

35. Where do you keep milking cows?

1. Own residence compound 2. Detached from own house

36. Do you think that the farm is located appropriately? 1. Yes 2. No

37. Do you have access to veterinary services? 1. Yes 2. No

38. If the answer for question no. 35 is yes, from where do you get this service?

1. Government 2. NGOs 3. Private 4. Other, specify_____

39. If the answer for question no. 35 is no, what is the problem? Mention

_____

_____

_____

40. Is there any extension service given for cattle especially milk production?

1. Yes 2. No

41. If the answer for question no. 38 is yes, source and frequency of visit in the last 12 months?

a. Source_____ b. Frequency _____

42. Is there a need for credit services for your dairy farm? 1. Yes 2. No

43. If the answer for question no. 40 is yes, do you have access for credit?

1. Yes 2. No

44. If the answer for question no. 41 is yes, from where did you get the credit?

_____

_____

_____

45. If you get credit access do you think your production will increase?

1. Yes 2. No

46. Do you have enough income to perform dairy farming? 1. Yes 2. No

47. Do you get a support from the governmental institutions? 1. Yes 2. No

48. If the answer for question no. 45 is yes, from where did you get this support? (multiple answers are possible)

1. Office of urban agriculture development 2. Office of small and micro enterprise

3. Office of trade and industry 4. Other, specify_____

VI. Constraints and Opportunities of Dairy Production

49. Are you willing to continue in dairying and expanding? 1. Yes 2. No

50. If the answer for question no.49 is yes, what is the opportunities to continue in dairy production in the future?

_____

_____

_____

51. If the answer for question no. 49 is no, why?

_____

_____

_____

52. Do you have an intention for further processing of the raw milk? 1. Yes 2. No

53. If your answer for question number 52 is yes , in what way?

_____

_____

_____

54. What problems have you faced in your milk production?

_____

_____

_____

55. What do you recommend in order to provide a solution for current challenges?

_____

_____

_____

ዩኒቨርሲቲ መቐለ

ቢዝነስን ኢኮኖሚክስን ኮሌጅ

ስራሕ ኣመራርሓክፍሊ ትምህርቲ

ፕሮግራም ማስተር

እዚ ፅሑፋዊ መሕትት ዝተዳለወሉ ቀንዲ ዕላማ ንኩነታት ምርባሕ ፀባ ከፍቲ ኣመልኪቱ መረዳእታ ንምእካብ እዩ።

ጠቅላላ

ከባቢያዊ ምምሕዳር_____

I. ሓፈሻዊ ሕቶታት

1. ፆታ መራሒ ስድራ ሀ. ተባዕታይ ለ. ኣንስታይ

2. ኩነታት ሓዳር ሀ.ባዓል ሓዳር ለ. ዘይተመረዐወ ሐ.መበለት መ.ዝተፈትሐ ሰ.ኣየድልን

3. ዕድመ መራሒ ስድራ ሀ. 18-28 ለ. 29-39 ሐ. 40-50 መ. ልዕሊ 50

4. ደረጃ ትምህርቲ መራሒ ስድራ ቤት

ሀ. ዘይተማህረ ለ.ምፅሓፍን ምንባብን ዝኽእል ሐ.ቀዳማይ ደረጃ

መ.2ይ ደረጃ ረ.ዲፕሎማን ልዕሊኡን .

5. ስራሕቲ ምርባሕ ፀባ መደበኛ ስራሕኩም ድዩ? ሀ. እወ ለ. ኣይፋሉን

6. ንሕቶ ቁፅሪ ሓሙሽተ መልስኩም ኣይኮነን እንተኾይኑ ዋና ስራሕኩም እንታይ እዩ?

ሀ. ሰራሕተኛ መንግስቲ ለ. ነጋዳይ ሐ. ዝይስሩዕተቆፃሪ መ. ካልእ ይገለፅ_____

II. ኣብ ምህርቲ ፀባ ዘድሃበ መጠይቅ

1.ዓይነት ምህርቲ ሕርሻኩም _____

2. በዝሒ ኣላሕምኩም

ሀ. 1-3 ለ. 4-6 ሐ. 7-9 መ. ልዕሊ 10

3. ምህርቲ ፀባ ከፍቲ ካብትጅምሩ ክንደይ ዓመት ጌርኩም

ሀ. ኣብ ውሽጢ ዝሓለፈ 5 ዓመታት ለ. ካብ 6-10 ዓመታት

ሐ. ll- 15 ዓመታት መ. ካልእ ይገለፅ_____

4. ኣብ ስራሕቲ ምህርቲ ፀባ ንክትሳተፉ ዘተባበዐኩም ነገር እንታይ እዩ?

ሀ. ትርፋማ ስለ ዝኾነ ለ. ናይ ቤተሰብ ምግቢ መጠን ንምዕባይ

ሐ. ከም ናይ ትርፊ ግዜ ስራሕ መ. ካልእ ይገለፅ_____

5. ንፀባ ላሕሚ እትጥቀሙለን ኣላሕም ካበይ ትረኽብወን?

ሀ. ዝተገዝኣ ለ. ካብ ወላዲ ዝተወረሳ ሐ. ኩሉ

6. መበቆል ዘርኢ ኣላሕምኩም

ሀ. መቐለ ለ. ካብ መቐለ ወፃኢ ኣብ ውሽጢ ክልል ሐ. ካብ ክልል ወፃኢ

መ. ሕዋስ ናይዞም ኣብ ላዕሊ ዝተጠቐሱ ረ. ካልእ ይገለፅ_____

7. ዓሌት ከፍቲ ሀ. ናይ ሓበሻ ላሕሚ ለ. ድቃላ ላሕሚ ሐ. ኩሉ

8. ኣየናይ ዓሌት ላሕሚ እዩ ዝለዓለ ትርፊ ዘለዎ? ሀ. ናይ ሓበሻ ላሕሚ ለ. ድቃላ ላሕሚ ሐ. ኩሉ

9. ንመፃኢ አየናይ ዓይነት ዘርኢ ከፍቲ ክትሕዙ ትደልዩ?

ሀ. ናይ ሓበሻ ላሕሚ ለ. ናይ ድቃላ ላሕሚ ሐ. ኩሉ

10. እንታይ ዓይነት ናይ ምርባሕ ስርሓት ትጥቀሙ?

ሀ. ብመርፍእ ለ. ብተፈጥሮ ሐ. ብኽልቲኡ መ.ካልእ ይገለፅ_____

11. ብመርፍእ እንተኾይኑ እቲ ኣገልግት ካበይ ትረኽቡዎ?

ሀ. ካብ መንግስቲ ለ. መንግስታዊ ካብ ዘይኮኑ ትካላት

ሐ. ካብ ናይ ግለሰብ መ. ካልእ ይገለፅ_____

12. ኣብናይ መርፍእ ኣገልግሎት ሽግር ኣለኩምዶ? ሀ. እወ ለ. የብልናን

13. መልሶም እወ እንተድኣኮይኑ ብኸመይ?

ሀ. ኣገልግሎት ስለ ዘየለ ለ. ኣገልግሎት ወሃብቲ ፍቓድኛታት ስለ ዘይኮኑ

ሐ. ሕፅረት ዘርኢ መ. ካልእ ይገለፅ_____

14. ዓይነት ምግቢ ንእንስሳት ሀ. ፍሩስካ ለ. ሓሰር ሐ. ሳዕሪ ምግሃፅ መ. ሳዕሪ ዝተዓፀደ

ረ. ሓተላ ሰ. ሕዋስ ናይዞም ኣብ ላዕሊ ዝተጠቐሱ ሸ. ካልእ ይገለፅ_____

15. ፍልፍል ምግቢ እንስሳትኩም

ሀ. ናይ ብዕለይ ለ. ዝተዓደገ ሐ. ኩሉ መ. ካልእ ይገለፅ_____

16. ናይ እንስሳ ምግቢ ሕፅረት ኣለኩም ዶ? ሀ. እወ ለ. የብልናን

17. መልስኩም ን ቁፅሪ 16 እወ እንተ'ኾይኑ መዓዝ መዓዝ? _____

18. ን ሕፅረት ምግቢ እንስሳ ኣብ መቐለ እቶም ዋና ምኽንያት እንታይ እንታይ እዮም?

_____

_____

_____

III. ዕዳጋ ምህርቲ ፀባ

19. ናይ ኣላሕምኩም ሚባ ንምንታይ ትጥቀሙሉ?

ሀ. ንመሸጣ ለ. ንማደበርያ ሐ. ንመንደዲ መ. ካልእ ይገለፅ_____

20. ፀባ ምሻጥ መዓዝ ጀሚርኩም? _____

21. ምህርቲ ፀባኩም እንትሸጡ ዘሸግርኩም ወቅትታት ኣለዉ'ዶ? ሀ. እወ ለ. የለን

22.መልሶም ን ቁፅሪ 26 እወ እነተኾይኑ ኣብ ኣየኖት ወቕትታት እዮም?

ሀ. ኣብ ናይ ዖም ወቕቲ ለ. ኣብ ኩሎም ወቕትታት

23. ፀባ ከይተሸጠ ክተርፍ ከሎ እንታይ ትገብርዎ?

ሀ. ንባዕልና ንትቀመሉ ለ. ንቤተሰብ ነከፋፍሎ

ሐ. ናብ ካሊእ ንቅይሮ መ. ካልእ ይገለፅ_____

24. ዓይነት ዓማዊልኩም?

ሀ. ናይ ገዛ ተጠቀምቲ ለ. ነጋዶ ሐ. ካፌ መ. ካልእ ይገለፅ_____

25. ፀባ ብኽመይ ትሸጥዎ?

ሀ. ብ ኮንትራት መልክዕ ለ. በብ ዕለቱ ሐ. ብኽልቲኡ መ. ካልእ ይገለፅ_____

26. ፀባኹም እትሸጥሉ ቦታ ኣበይ እዩ?

ሀ. ኣብ ገዛ ለ. ኣብ መከፋፈሊ ቦታ ሐ. ገዛ ገዛ እናዞርና መ. ካልእ ይገለፅ_____

27. ምህርትኩም ንጠለብ ዕዳጋ ይሸፍን'ዶ? ሀ. እወ ለ. ኣይሸፍንን

28. ኣብ ከተማ መቐለ ዘሎ ቀረብን ጠለብን ፀባ ተመጣጣኒ እዩ ዶ ትብሉ? ሀ. እወ ለ. ኣይፋሉን

29. መልሶም ነ ቁፅሪ 33 ኣይፋሉን እንተኾይኑ ንምንታይ ይመስለኩም?

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IV. ከይዲ ምሕላብ ፀባ

30. ክትሓልቡ ከለኹም መሕለቢ መሳርሒ ትጥቀሙ 'ዶ? ሀ. እወ ለ. ኣይፋሉን

31. ቅድሚ ምሕላብኩም ን ድሕሪ ምሕላብኩም እቲ ጡብ ላሕሚ ትሓፅብዎ 'ዶ? ሀ. እወ ለ. ኣይፋሉን

V. ናይ ኣገልግሎት ኣቕርቦት

32. ን እንስሳትኩም ዝኸውን እኩል ዝኾነ ቀረብ ማይ ኣሎ ዶ ትብሉ? ሀ. እወ ለ. ኣይፋሉን

33. ንመስተ እንስሳትኩም ትጥቀምሉ ማይ

ሀ. ካብ ቡንቧ ለ. ካብ ዒላ ሐ. ካብ ሩባ መ. ካልእ ይገለፅ_____

34. እቲ ዘለኩም ናይ እንስሳ መራብሒ ቦታ እኹል እዩ ዶ ትብሉ? ሀ. እወ ለ. ኣይፋሉን

35. መንበሪ ኣላሕምኩም ኣብ ምንታይ 'ዩ?

ሀ. ናይ ባዕለን መንበሪ ለ. ኣብ መንበሪ ገዛን ጥቓ

36. ናይ እንስሳ መራብሒ ቦታኹም ኣብ ግቡእ ቦታ 'ዶ ተቐሚጡ ትብሉ? ሀ. እወ ለ. ኣይፋሉን

37. ኣገልግሎት ሕክምና እንስሳት ትረኽቡ ዶ? ሀ. እወ ለ. ኣይንረክብን

38. መልሶም ንቁፅሪ 35 እወ እንተኾይኑ ኣገልግሎት ከባይ ትረኽቡ?

ሀ. ካብ መንግስቲ ለ. መንግስታዊ ካብዘይኮኑ ተካላት ሐ. ካብ ግለሰብ መ. ካልእ ይገለፅ_____

39. መልሶም ንቁፅሪ 35 ኣይንረኽብን እንተኾይኑ ችግሮም ይናገሩ

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40. ንዕብየት ምህርቲ ፀባ ናይ ቢዓል ሞያ (ኢክስቴሽን) ኣገልግሎት ትረክቡዶ? ሀ. እወ ለ. ኣይንረክብን

41. መልሶም ን ቁፅሪ 38 እወ እንተኮይኑ ካበይ ይመፁ? ብዓመት'ኺ ክሳብ ክንደይ ግዜ ይመፁ?

ካበይ_____ በዝሒ_____

42. ንናይ ፀባ ምህርትኹም ናይ ልቓሕ ኣገልግሎት የድሊየኩምዶ? ሀ. እወ ለ. ኣየድለየናን

43. መልሶም እወ እንተኾይኑ ልቓሕ ትረኽቡ'ዶ? ሀ. እወ ለ. ኣይንረክብን

44. እንተድኣ ትረኽቡ ኮይንኩም ከበይ ትረክቡ?

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45. ልቓሕ እንተትረኽቡ ነይርኹም ምህርቲ ፀባኩም ምወሰኽ ዶ ነይሩ? ሀ. እወ ለ. ኣይውስኽን

46. ምህርቲ ፀባ ንምስራሕ እኹል ዝኾነ ገንዘብ ዶ ኣለኹም? ሀ. እወ ለ. የብልናን

47. መንግስቲ ኣብ ምህርቲ ፀባ ድጋፍ ይገብረልኩም ᾽ዶ? ሀ. እወ ለ. ኣይፋሉን

48. መልሶም ን ቁፅሪ 45 እወ እንተኾይኑ ካበየናይ ቢሮ?

ሀ. ቢሮ ሕርሻ ለ. ደኣንት ሐ. ቢሮ ንግድን ኢንድስትሪን መ. ካልእ ይገለፅ_____

VI. ኣብ ምህርቲ ፀባ ዘጋጥሙ ፀገማትን ጥቅምታቶምን

49. ንመፃኢ ስራሕ ምህርቲ ፀባ ንምቕፃልን ምስፍሕፋሕን ድልየት ኣለዎም'ዶ? ሀ. እወ ለ. ድሌት የብለይን

50. መልሶም ን ቁፅሪ 49 እወ እንተኾይኑ ንመፃኢ እንታይ ጥቕሚ ስለ ዝረኽብሉ እዩ?

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51. መልሶም ን ቁፅሪ 49 ድሌት የብለይን እንተኾይኑ ንምንታይ?

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52. ናብ ካሊእ ፕሮሰስ ንምግባር ሓሳብ አለኩም 'ዶ? ሀ. እወ ለ. ኣይፋሉን

53. መልሶም ን ቁፅሪ 52 እወ እንተኾይኑ ብከመይ መልክዕ?

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54. ኣብ ናይ ምርባሕ ፀባ ስራሕኹም ዘጋጠመ ፀገም እንተሃልዩ?

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55. እዞም ፀገማት ንምቕራፍ ዘኽእሉ መንገድታት ይግለፁ?

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